

What Is Claimed Is:

- 1 1. A silicon-on-insulator (SOI) semiconductor chip comprising:
2 a peripheral edge;
3 a substrate;
4 an oxide layer on the substrate;
5 a silicon layer on the oxide layer;
6 an active area;
7 an isolation barrier including a groove:
8 (a) being disposed slightly inward of the peripheral edge of the
9 chip,
10 (b) extending through the silicon layer and through the oxide
11 layer and partially into the substrate to prohibit impurities in the oxide layer outside the
12 isolation barrier from diffusing into the oxide layer inside the isolation barrier, and
13 (c) surrounding completely the active area of the chip, and
14 a passivation layer on the silicon layer and extending to the groove.
- 1 2. The SOI chip according to claim 1 wherein the active area of the
2 chip includes a gate located on the silicon layer, a gate metal contact deposited above
3 and forming an electrical contact with the gate, and at least one metal contact deposited
4 above and forming an electrical contact with the silicon layer.
- 1 3. The SOI chip according to claim 1 wherein the passivation layer
2 is selected from the group consisting of silicon nitride, polysilicon, oxide, and nitride.
- 1 4. The SOI chip according to claim 1 further comprising a barrier
2 material located (i) over the passivation layer on the silicon layer, and (ii) in the groove
3 presenting an additional barrier to impurities in the oxide layer outside the groove from
4 diffusing into the oxide layer inside the groove.

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1 5. The SOI chip according to claim 4 wherein the barrier material is
2 dielectric.

1 6. The SOI chip according to claim 5 wherein the barrier material is
2 selected from the group consisting of phosphosilicate glass (PSG), BPSG, nitride and
3 oxide.

1 7. The SOI chip according to claim 1 further comprising the
2 passivation layer on the silicon layer and in the groove.

1 8. The SOI chip according to claim 7 wherein the passivation layer
2 is selected from the group of silicon nitride, polysilicon, oxide, and nitride.

1 9. The SOI chip according to claim 7 further comprising an oxide
2 located in the groove and over the passivation layer which is on the silicon layer and in
3 the groove.

1 10. The SOI chip according to claim 7 further comprising a barrier
2 material located on the passivation layer, over the silicon layer and in the groove,
3 presenting an additional barrier to impurities in the oxide layer outside the groove
4 from diffusing into the oxide layer inside the groove.

1 11. The SOI chip according to claim 10 wherein the barrier material
2 is dielectric.

1 12. The SOI chip according to claim 11 wherein the barrier material
2 is selected from the group consisting of phosphosilicate glass (PSG), BPSG, and
3 nitride.

1 13. The SOI chip according to claim 10 further comprising an oxide
2 located in the groove and over the barrier material and the passivation layer which are
3 in the groove.

1 14. The SOI chip according to claim 1 wherein the groove is defined
2 by side walls and an open bottom, the SOI chip further comprising the passivation
3 layer on the silicon layer and the side walls of the groove with the bottom of the
4 groove devoid of the passivation layer.

- 12 (a) being disposed slightly inward of the peripheral edge of the
- 13 chip,
- 14 (b) extending through the silicon layer and through the oxide
- 15 layer and partially into the substrate to prohibit impurities in
- 16 the oxide layer outside the isolation barrier from diffusing
- 17 into the oxide layer inside the isolation barrier, and
- 18 (c) surrounding completely the active area of the chip;
- 19 a barrier material located (i) over the passivation layer on the silicon
- 20 layer, and (ii) in the groove, presenting an additional barrier to impurities in the oxide
- 21 layer outside the groove from diffusing into the oxide layer inside the groove.

- 1 22. A silicon-on-insulator (SOI) semiconductor chip comprising:
- 2 a peripheral edge;
- 3 a substrate;
- 4 an oxide layer on the substrate;
- 5 a silicon layer on the oxide layer;
- 6 a passivation layer on the silicon layer;
- 7 an active area;
- 8 an isolation barrier, including a groove:
- 9 (a) being disposed slightly inward of the peripheral edge of the
- 10 chip,
- 11 (b) extending through the silicon layer and through the oxide
- 12 layer and partially into the substrate to prohibit impurities in
- 13 the oxide layer outside the isolation barrier from diffusing
- 14 into the oxide layer inside the isolation barrier, and
- 15 (c) surrounding completely the active area of the chip;

16 a barrier material located:

17 (a) over the passivation layer on the silicon layer, and

18 (b) in the groove, presenting an additional barrier to impurities
19 in the oxide layer outside the groove from diffusing into the oxide layer inside the
20 groove.

1 23. The SOI chip according to claim 22 wherein the passivation layer
2 is selected from the group consisting of silicon nitride, polysilicon, oxide, and nitride.

1 24. The SOI chip according to claim 22 wherein the barrier material
2 is dielectric.

1 25. The SOI chip according to claim 24 wherein the barrier material
2 is selected from the group consisting of phosphosilicate glass (PSG), BPSG, nitride
3 and oxide that prevents impurities in said oxide layer outside said isolation barrier
4 from diffusing into said oxide layer inside said isolation barrier.

1 26. The SOI chip according to claim 22 wherein the groove has a
2 width of about 1-2 microns.

1 27. The SOI chip according to claim 22 wherein the groove in the
2 isolation barrier extends through the passivation layer.

1 28. A silicon-on-insulator (SOI) semiconductor chip comprising:
2 a peripheral edge;
3 a substrate;
4 an oxide layer on the substrate;
5 a silicon layer on the oxide layer;
6 an active area;
7 an isolation barrier:

3 and oxide that prevents impurities in said oxide layer outside said isolation barrier
4 from diffusing into said oxide layer inside said isolation barrier.

1 34. The SOI chip according to claim 31 further comprising an oxide
2 located in the groove and over the barrier material and the passivation layer which are
3 in the groove.

1 35. The SOI chip according to claim 22 wherein the barrier material
2 is conductive.

1 36. A silicon-on-insulator (SOI) semiconductor chip comprising:
2 a peripheral edge;

3 a substrate;

4 an oxide layer on the substrate;

5 a silicon layer on the oxide layer;

6 an active area;

7 an isolation barrier, including a groove:

8 (a) being disposed slightly inward of the peripheral edge of the
9 chip,

10 (b) extending through the silicon layer and through the oxide
11 layer and partially into the substrate to prohibit impurities in
12 the oxide layer outside the isolation barrier from diffusing
13 into the oxide layer inside the isolation barrier, and

14 (c) surrounding completely the active area of the chip;

15 a passivation layer on the silicon layer and in the groove; and

16 a barrier material located in the passivation layer, over the silicon layer,
17 and in the groove presenting an additional barrier to impurities in the oxide layer
18 outside the groove from diffusing into the oxide layer inside the groove.

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1 37. A silicon-on-insulator (SOI) semiconductor chip comprising:
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3 a substrate;
4 an oxide layer on the substrate;
5 a silicon layer on the oxide layer;
6 an active area;
7 an isolation barrier, including a groove:

- 8 (a) being disposed slightly inward of the peripheral edge of
9 the chip,
10 (b) extending through the silicon layer and through the oxide
11 layer and partially into the substrate to prohibit impurities in
12 the oxide layer outside the isolation barrier from diffusing
13 into the oxide layer inside the isolation barrier, and
14 (c) surrounding completely the active area of the chip.

1 38. A silicon-on-insulator (SOI) semiconductor chip comprising:
2 a peripheral edge;
3 a substrate;
4 an oxide layer on the substrate;
5 a silicon layer on the oxide layer;
6 an active area;
7 an isolation barrier, including a groove:

- 8 (a) being disposed slightly inward of the peripheral edge of the
9 chip,



